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An Application of the Data Envelopment Analysis Methodology in the Performance Assessment of the Zaragoza University Departments

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Abstract. The increasing interest in the measurement of the performance and efficiency in non-profit public organisations, has led to the development of performance indicators, each of which attempts to measure the output (input) of a group of nearly homogeneous products (factors of production). The Data Envelopment Analysis (DEA) methodology enables to aggregate performance indicators in order to obtain an overall performance measure through the comparison of a group of decision units. This paper conducts an application of the DEA methodology in the assessment of the performance of the Zaragoza University's departments (Spain). The indicators included concerns both the teaching and the research activity of the departments. The results reveal those departments that more efficiently carry out these activities. Finally, we discuss about the existence of differences in the strengths and weaknesses between departments of different areas.

Keywords: Data Envelopment Analysis, performance assessment, higher education efficiency, performance indicators.

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1. Introduction

The scrutiny upon governments has demanded public entities to increase the efficiency in using the resources they manage. Moreover, there has also been a greater autonomy of the governmental units resulted from the decentralisation processes that recently took place in a number of different countries. These changes called for the use of new management techniques able to value the performance of these units and to provide tools that can contribute to the improvement of decision-making processes in the public sphere.

However, to evaluate activities framed inside the non-lucrative public sector, the usefulness of certain representative indicators of the effectiveness and efficiency of an entity becomes rather limited. That is indeed the case of fundamental concepts such as profit and profitability, commonly applied in the case of lucrative organisations, which cannot readily be applied to analyse public issues.

As Boussofiane and Dyson indicate (1991: 1-15) profitability should not be the only performance measure even for profit making organisations. They argue that environment factors outside the company control can affect it. Thus, when the unit of analysis is an organisation, public or private, without lucrative aims, subject to multiple objectives and whose outputs cannot always be expressed in quantitative terms, the assessment of its activity needs a combination of performance indicators.

Decreasing effectiveness of the potential indicators able to represent the general efficiency of the entity is due to two linked. One is that each group of indicators evaluates an aspect different from the activity. The other is that different kinds of stakeholders will be interested in different aspects of its management.

Therefore, in situations in which each input and output cannot be added in a significant index of productive efficiency, it is useful the application of the Data Envelopment Analysis model (DEA) as an added measure of the relative efficiency of a group of homogeneous Decision Units Making (DMU).

This paper describes the use of DEA methodology to assess the performance of the 52 Departments within the University of Zaragoza (Spain) according to data of the year 1999. In first instance, we will select those variables that more accurately describe the consume of resources and the activity carried by a Spanish university department. Then 4 DEA models will be computed from different input – output mixes. The results of the

analysis will determine the comparatively efficient DMUs, intending to identify the causes because of which the other DMUs are inefficient. Finally we will discuss the existence of significant differences in the composition of the resources and activities developed between departments of difference areas.

Through this study, we seek to contribute to the management of the universities, in a moment where there is an increasing interest in their performance measurement. In the actual higher education sector context, in which universities are forced to compete with each other, becomes essential carrying out internal evaluations of the units that compose the institutions. In this sense, we expect our work provides relevant information about the accomplishments of the departments of the University of Zaragoza, and it can be used in the decision making process.

2. Background

In recent years, several studies have undertaken analysis of efficiency in Universities using the DEA methodology. Each study differs in its scope, meaning the definition of the DMUs are subject to analysis. Among the most important papers are the following:

Rodhes and Southwick (1986) carry out an analysis about the efficiency in the USA Private Universities in comparison to the Publics, by means of DEA model. They regarded as DMU the own University on the whole.

Kwimbere (1987) also applyes a DEA model in order to assess the performance of Engineering, Mathematics and Physics departments of a set of universities in UK. T he DMUs regarded are the departments of these areas.

Tomkins and Green (1988) conduct an DEA analysis to test the performance of 20 Accounting departments in UK. This time, the DMUs are the accounting departments of the mentioned universities and it is considered both the teaching and researching activity of them. Furthermore they confront their results with a ranking constructed by means of a elemental analysis of staff/students ratios.

Harris (1990) accomplishes a study concerning the assessment of research performance of university economics departments in Australia. The DMUs are the

Australian departments of economics, while the activity analysed is their research programmes.

Johnes and Johnes (1993) investigate the use of DEA in the assessment of research performance of university departments of the UK over the period 1984-88. This period coincides with that used in the second research selectivity exercise conducted by the Universities Funding Council (UFC) in 1989.

Pina and Torres (1995) analyse through the DEA methodology the research and teaching activity of the Accounting Departments in Spanish public universities.

García Valderrama (1996) focus her work on evaluating the research of the departments of the University of Cadiz (Spain). This is an example in which several disciplines are submitted to the DEA analysis.

Melville and Debasish (1998) report the results of using data envelopment analysis (DEA) to assess the relative efficiency of 45 Canadian universities. These outcomes are obtained from 9 different specifications of inputs and outputs. Moreover, they complete the work with a regression analysis in order to identify further determinants of efficiency.

Sarrico and Dyson (2000) explore the contribution of DEA methodology to inform management. It is illustrated in an application to the University of Warwick, using concepts from the technique of the Boston Consulting Group matrix, to support strategic option formulation.

3. Data Envelopment analysis

The method used in this study is the model known as DEA, developed by Charnes et al. (1978) and Banker et al. (1989). DEA is a method used for the measurement of efficiency in cases where multiple input and output factors are observed and when it is not possible to turn these into one aggregate input or output factor. Since 1978, thousands of articles have been published using this analysis technique in various fields.

This method is especially adequate to evaluate the efficiency of non-profit entities that operate outside the market, since for them the measures of efficiency such as income and profitability do not work satisfactorily. Two main reasons being that these

entities are not focused on obtaining profits, and the main source of finances does not come from the sale of goods and services.

DEA provides a comparative efficiency indicator of the units to evaluate. The units analyzed are called decision-making units (DMUs). In DEA, the relative efficiency of a DMU is defined as the ratio of the total weighted output to the total weighted input. If the homogeneity is maintained, the outputs and inputs can be expressed in any unit of measurement.

In contrast to the traditional parametric production function, where a specific pre-defined functional form is assumed to apply each observation, DEA makes no assumptions about the form of the production function. The actual inputs and outputs observed are used to estimate a benchmark production frontier. For this reason, the efficiency indicator obtained is relative, since it is elaborated by referring to the rest of DMUs. DEA allows each DMU to choose the vectors of input and output weights which maximise its own ratio of weighted output to weighted input, subject to the constraint that the weight vector chosen by the k_{th} DMU should not allow any DMU achieve a ratio of weighted output to weighted input in excess of unity. Thus each DMU is judge according to standards set by itself. There are available computer programs that carry out the calculation process.

The dual model of the program can be expressed through the following algebraic expression;

$$\text{Min } Z_0 - e\left(\sum_{i=1}^{m} s_{i-} + \sum_{r=1}^{s} s_{r+}\right)$$

Subject to:

$$Z_o x_{io} - \sum_{j=1}^{n} x_{ij} a_j - s_i^- = 0$$

$$\sum_{j=1}^{n} a_j y_{rj} - s_r^+ = y_{ro}$$

for all a_j, u_r, $v_i > 0$; r=1,….s; i=1,….m; j=1,….n

where “e” is a small number which has as objective to assure that no output or input are excluded from the final solution.

S_i^-, S_r^+ represent the slack variables.

The inputs and outputs observed for each DMU are incorporated into the restrictions as:

Xij = value of the input “i” for the DMU j ; Yrj = value of the output “r” for the DMU j

This model provides a relative measurement of the global efficiency of each one of the DMUs studied. On the other hand, and in accordance with Banker (1984) and Banker et al. (1989) introduce the concept of “Most Productive Scale Size” (MPSS) to define the size of scale that maximizes the efficiency of the DMU studied. At the same time, they demonstrate that it is possible to separate the earlier mentioned global efficiency into two components, namely technical efficiency which is determined by the situation of the DMU on the frontier of efficient production, and efficiency of scale which is given by the size of the DMU which make it operate in a zone of constant or variable returns.

Banker et al. (1989) determine technical by introducing into the above lineal programming model the restriction:

$$\sum_{j=1}^{n} a_j = 1,$$

In this study, the technical efficiency obtained has been calculated considering variable scale yields –growing, constant and diminishing-, which assures that all DMUs are evaluated taking as benchmarks those that operate with a similar volume of activity or production.

Nevertheless, there is a vast literature about the model accessible for the reader, in order to get a more exhaustive explanation of the methodology. In particular I would like to refer to the next recent books: “Introduction to the theory and application of data envelopment analysis: a foundation text with integrated software” by E. Thannassoulis (2001); “Data Envelopment Analysis: A comprehensive text with models, applications, references” by W. Cooper et al. (1999); and finally “Data Envelopment Analysis:

Theory, Methodology and Applications" by A. Charnes (1995). Moreover it would be advisable to anyone interested in the model visiting the web page of the DEA called www.deazone.com. This DEA homepage, that contains a lot of information and topics about the model, was implemented in 1995 at Warwick University (England) and since then, it is continuously being updated.

4. Variables

The results of DEA model are sensitive to the inputs and outputs previously specified. Indeed, an accurate selection of the indicators, which are best adapted to the objective of the analysis, is critical to the success of the study. Next, we discuss the variables that we consider to include in our analysis. We are aware that this process is a strong controversial issue. On one hand, it's not easy define the indicators that more properly represent the outputs produced by an educational unit or the inputs that should be considered, and, on other hand, this kind of studies have to face the usual lack of information concerning the results of the higher education activity.

Inputs

The resources or inputs indicators are units of measurement, which represent the factors used to carry out the delivery of services. The identification and measurement of these factors is crucial in a fair evaluation of the economy and efficiency in the programs and services management. Previous studies on other performance models (Johnes 1996) have shown that inputs of universities can be categorised in various ways. In our case, we classify the inputs used by a department in three groups: Human, Financial and Material resources. The input indicators used in the study are the following:

Human Resources

The staff of a department is formed by academic and research personal (P.D.I.) and services and administration personal (P.A.S). We will only include the former in the model considered, since the later neither provides significant differences between the DMUs nor is of departmental concerns. For this reason, it should not be used to assess their performance.

In regards to the PDI, we will differentiate between PDI doctor and PDI non-doctor. Whereas the first group works simultaneously in teaching and research, the PDI non-doctor concentrates their activity on teaching (or at least, his scientific production is not as excellent as that of the doctor's group). Moreover, the quality of the production is supposedly to be better in the doctor's group than in the non-doctor's group. In order to achieve a better homogeneity in the magnitudes, we will consider full time activity as the unit of analysis.

Financial Resources

Each department disposes of certain amount of funds intended to the development of their activities. The department is the unit in charge of the management of these resources. This variable will be represented in the model, through the budgetary assignment to the departments. Thus, a possible way to correct the inefficiency of a department would consist on carrying out a budgetary reduction. Notwithstanding that the budget that departments manage is not too high, they have discretionary to allocate these resources according to criterions related to performance.

Material Resources

Moreover, the departments keep the inventory of other goods that will be used in the activity. Since these elements remain in the department during several exercises, we should consider the annual paying-off, as the variable that more accurately defines the annual consumption of capital factors.

We estimate the annual paying-off rate taking for basis the IGAE 14 December 1999 Resolution, which has regulated the accounting operations that take place in the end of the exercise, such as paying-off, provisions and allocation of some revenues and expenses. According to the Resolution, the paying-off quotas are determined with general character in accordance with the lineal quota method.

Since we only have an overall valuation of the departments' assets without differentiating types of goods, we will establish a single coefficient of annual amortisation. This coefficient has been estimated taking the average of coefficients that

point out the mentioned Resolution for those elements more representatives in the asset of a department.[1]

Outputs

Outputs indicators measure the yield or the level of activity of programs and services. A University Department develops its activity in two different areas: teaching and research. A broad range of outputs of universities can be found in Segers (1990). Furthermore, it is always useful to disclose indicators that provide information about the quantity and the quality of the activity (Pina &Torres, 1995). The quality, as an attribute that affects the user's perception, can also modify the productive process input/output relation. For this reason, it must be considered to assess the efficiency of the process.

Several indicators can be displayed in order to measure the quality of the teaching and research activity carried out by a department. For instance, we have considered the followings:

- ✓ The results of teaching evaluation surveys reflect the quality noticed by the users of the service, the students. Other useful teaching quality indicators are the rates achieved in National Competitions and the employment opportunities of the graduated.
- ✓ The accomplishment of a research quality evaluation can be performed by means of indicator such as *The researching commitment of the departmental staff,* or *Papers disclosed in journals contained in the Citation Index,* or through *The social incidence of the outcomes (OTRI contracts, art. 11 LRU[2])*.

Both the absence of some data and the confidentiality of others have not enabled the inclusion of indicators related to the teaching quality assessment. However we have been able to introduce some indicators that provide information about the quality of the research implemented.

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[1] Concretely, we include the following items detailed in the Resolution:

	Amortization period
▪ *Furniture, tackle and other office's equipment*	*20*
▪ *Photocopier and reproducer machines*	*14*
▪ *Information processing equipment*	*8*
▪ *Computer systems and software*	*6*

On average, we considered 12 years period of paying-off. It means a amortization rate close to the 9%[1]

[2] University Reform Law (1983)

Teaching indicators

Teaching is seen as the primary function of a department. Because of the frequent lack of good measures, indicators such as the number of graduates often estimate "teaching" output. The obvious variable to measure the academy activity carried out by a department is the "number of students registered in the department" since it represents the number of users of the DMU. Besides, the higher the number of students enrolled the higher the activity in the department. However, this choice has a number of shortcomings. For instance, it is not a homogenous variable for all departments and the data can be corrupted. For reasons like that we have chosen as representative indicator of the teaching activity, the following magnitude:

CREDITS REGISTERED * EXPERIMENTAL COEFFICIENT

This indicator, suppose an improvement regarding the "number of students registered" because it is a fairer measure of the real teaching activity of a department. It is necessary to be aware that all subjects do not have the same duration. For this reason, the number of student's hours is a better approach to the level of teaching activity in a department rather than the number of undergraduate students.

However, we have to take into account that the departments related with practical areas require more reduced students group as consequence of the experimental character of the same. The same number of credits represents different activity depending on the department. For this reason, we have multiplied the number of credits registered, by a experimental coefficient[3], in order to obtain a indicator that allow to compare the activity of departments of different nature.

PhD CREDITS OFFERED

Through this indicator, we want to reflect the effort that each department carries out in the teaching of postgraduate programmes. It is important to segregate this variable from the undergraduate teaching because it include different tasks and aims.

Research indicators

Research is the other principal activity developed by a department. When measuring the research output of a department we have to take in account that several

[3] The coefficients used, have been developed by the University of Zaragoza in his Personnel Theoretical elaboration Document, for the compute of the teaching capacity in every area. They fluctuate between 1 to 5.

indicators together give an indication of the performance, but separately each indicator has its shortcomings. The selected indicators, attempt to collect the most significant aspects in the research activity of a department, and the quality in the performance.

PhD THESIS READ DURING THE LAST YEAR

This variable assesses the department ability to form new researchers. Theses are research outcome, as they reflect the results of the effort undertaken by the departments in their doctoral programmes.

RESEARCHING ANNUAL INCOMES

These sources of income result from the success and external recognition of the researching work developed by the department. Therefore, this variable is not only an indicator of the volume of the scientific production of a department, but also of the quality of the same. We consider the revenues that have been obtained from the Researching Administrative Management Service, from Researching Results Transfer Office (OTRI) and from the foundation "Enterprise University of Zaragoza".

In this way, we have considered grants as an output of the research. However, it is reflected in the prior literature a debate on the role of research finance (Johnes and Johnes, 1993) . From our point of view, the value of research grants is purported to reflect the market value of the research conducted, and consequently it should be regarded as an output proxy. Nevertheless, other authors argue that because grants are spent on research assistance and other facilities which are an input into the production process, they should be regarded as an input.

COMPUTE OF DEPARTMENT RESEARCH ACTIVITY

This computation shows the number of credits conferred to the department's staff for reasons of their dedication to the research. The credits obtained by each individual researcher depend essentially on the research carried out during the prior years, external recognition of his labour in this field ("sexenios" of investigation[4]) and also the number of thesis supervised. Due to this composition, it is an indicator that measures both quantity and quality attributes of the research activity in a department.

Unfortunately, we don't dispose of data about the number of scientific publications produced by each department. Nevertheless, this information is recently being

elaborated by the University, and then, it will be able to be considered for future analysis.

5. Analysis of results

A drawback of the DEA technique, is that the relative efficiency score achieved by each DMU, can be sensitive to the number of inputs and outputs specified (Sexton 1986). Moreover, there isn't a conventional method for choosing one DEA to report in preference to any other. In any application of DEA, it is therefore important, to test the sensitive of the results to changes in input-output specification.

In this case, we have defined four DEA models with the referred above indicators. The four models are constructed similarly, using all the same inputs and just changing the output combination. The next table shows the different combinations of input-output, for each one of the DEA proposed (Table 1).

TABLE 1. DEA Models

	Model 1	Model 2	Model 3	Model 4
Inputs				
Doctors	X	X	X	X
Non doctors	X	X	X	X
Budgetary Assignement	X	X	X	X
Annual Pay-off	X	X	X	X
Outputs				
Credit* exper. coefficient	X	X	X	X
PhD Credits	X	X	X	
Thesis read last year	X	X		X
Research activity incomes	X		X	X
Research activity compute	X	X	X	X

[4] The National Committee of Research Assessment, implemented the "Sexenios" of Investigation 1989 as a national acknowledgement of a brilliant researching activity during the last six years.

As we can observe, the model 1 contains one variable more than the other models. Accordingly the properties of DEA analysis, the scores achieved by the departments in the first model will be at least equal than the scores in the rest of the models. This way, checking the changes in the results when we eliminate a variable in the models 2, 3 and 4, we can identify the strength of the departments with regard to the missing performance dimensions. If a department is not considered efficient in only one model, for example, this implies that the DMU bases its efficiency primarily on the variable which is omitted by the present model. On the other hand, when a department attains an efficient score in the four evaluations, this suggests that this department is operating satisfactorily in terms of all activities.

Next, Table 2 shows the coefficients of technical efficiency obtained by the departments analysed in each one of the models. The aim of measuring the level of efficiency using technical efficiency is that each department is compared with those that have similar characteristics. The departments that show a coefficient of 1 are consider as efficient, being allocated in the frontier efficient. When a department doesn't reach that value is evidencing some degree of inefficiency. We have applied the EMS program to run each one of the models. We have regarded variable returns to scale (VRS) and from an input orientation.

The results of the Model 1, which includes all variable discussed, reveal 36 departments operating comparatively efficient. It is convenient to emphasize that in this group are included departments related with every area of knowledge. Furthermore, considering the whole of the models, we notice 29 of them remain efficient regardless of the model conducted. These results prove the consistency of the efficiency achieved by these departments since, independently of the indicators, they are always evaluated as efficient.

In contrast there are a group of seven departments that don't reach the efficiency score in one of the models considered:

- The departments of *Animal Pathology*; *Mechanical Engineering*; *Chemical Engineering*; and *Design and Fabrication Engineering* don't attain the score of 1 in the model 2. This fact reveals that the key factor of its efficiency is the indicator "research annual incomes" that is missed in the model 2. Therefore

these DMUs stand out by their ability to generate incomes from the research. Nevertheless, they may improve their performance in the other activities.

- On the other hand, the departments of Hispanic Philology; Modern and Contemporary History; Educational Sciences are in all models considered efficient except for the model 3 that doesn't include the variable "Thesis read during the last year". The presence of this variable results decisive in their assessment, which suffers a significance drop when it is not included.

The Model 4 doesn't show any change with regard to the evaluation undertaken by the Model 1. This fact suggests that the variable PdD Credits is not relevant to explain differences in the efficiency of the departments.

Finally, there are 16 departments that none of them reaches a coefficient of 1 whichever it is the model chosen. Whereas the departments that show scores close to the efficiency level require a few changes in order to move to the frontier efficient, the departments that are farthest from the frontier will need to carry out fundamental reforms, although some of which will not be easy to be implemented. We should remind that when a unit results inefficient according to the DEA analysis, implies that although choosing the more favourable weights, there are other DMUs, which attain better results with the same weights.

TABLE 2. Coefficients of technical efficiency

DEPARTMENT	Model 1	Model 2	Model 3	Model 4
Anatomy, embryology and animal genetics	1	1	1	1
Microbiology, Preventive Medicine and Public Health	1	1	1	1
Biochemistry and molecular and cellular biology	1	1	1	1
Human Anatomy and histology	0,92	0,92	0,81	0,92
Surgery, gynaecology and obstetrics	1	1	1	1
Pediatrics, Radiology and Physical Medicine	1	1	1	1
Physiotherapy and infirmary	1	1	1	1
Medicine and psychiatry	1	1	1	1
Animal Pathology	1	0,90	1	1
Pathological anatomy, legal medicine, toxicology & health	1	1	1	1
Pharmacology and physiology	0,99	0,99	0,99	0,98
Earth Sciencies	0,92	0,92	0,92	0,92
Didactics of humanitatian and Social Sciences	1	1	1	1
Applied Physics	0,75	0,75	0,75	0,70
Physics of the condensed material	1	1	1	1
Theoretical Physics	1	1	1	1
Applied Mathematics	0,84	0,84	0,84	0,84
Mathematics	0,67	0,67	0,67	0,66
Statistical methods	0,75	0,75	0,75	0,75
Animal production and food Science	1	1	1	1
Analytical Chemistry	1	1	1	1
Inorganic Chemistry	1	1	1	1
Organic Chemistry and physical chemistry	1	1	1	1
Antiquity Studies	0,56	0,56	0,53	0,56
Artistic and Musical Expression	0,93	0,93	0,93	0,93
Hispanic philology	1	1	0,89	1
French philology	0,95	0,95	0,95	0,95
English and German philology	0,73	0,73	0,65	0,73
Philosophy and Science History	1	1	1	1
Geography and Territorial Planning	0,65	0,54	0,65	0,65
Art History	1	1	1	1
Medieval History	1	1	1	1
Modern and Contemporary History	1	1	0,90	1
General and Hispanic Linguistics	1	1	1	1
Languages and sciences didactics	1	1	1	1
Economic Analysis	1	1	1	1
Educational Sciences	1	1	0,69	1
Company Law	0,97	0,97	0,72	0,96
Private Law	0,87	0,87	0,87	0,87
Public Law	1	1	1	1
Economic and Business Management	1	1	1	1
Accounting and Finance	1	1	1	1
Economic History and Structure Public Economic	0,85	0,85	0,85	0,85
Psicology and Sociology	0,74	0,64	0,73	0,67
Documentation Science and history of science	1	1	1	1
Science And Technology of Material and Fluids	1	1	1	1
Design and fabrication engineering	1	0,93	1	1
Electronic and communications	1	1	1	1
Mechanical engineering	1	0,99	1	1
Chemical engineering and environmental technology	1	0,98	1	1
IT and System engineering	1	1	1	1
Electrical engineering	1	1	1	1

6. Conclusions

This study has evaluated the performance in the departments of the University of Zaragoza (Spain) in the year 1999 through 4 DEA models using different combinations of inputs and outputs. Accordingly with the results, there are a majority of departments that have been assessed efficient. Moreover, most of the departments that show inefficiencies are near to the aim value. There exists the possibility that this high number of efficient units responds to an elevate grade of heterogeneity among the departments. This fact would allow departments to be positioned in segments where they can avoid competing versus others. Furthermore, the results can be influenced by the number of variables introduced in the models. The more variables are introduced, the more units will compute efficient. However, obtaining a global measure of efficiency requires to take several factors into account being expressed through different variables.

Although there don't exist a standard characteristics that identify the departments qualified as efficient or non efficient, we find differences in the composition of the inputs and outputs between departments related to different areas.

- ✓ The departments associated with the biomedical area show a academic staff with prevalence of the doctors over the non doctor. The mean size of these departments is slightly smaller than the average of the University. As the coefficients of the departments that have been evaluated inefficient are near to 1, it will not be difficult to approach the efficiency.
- ✓ The departments related to scientific areas conduct a remarkable research activity that provide them high incomes, specially in engineering departments. Nevertheless it is necessary to take into account that they also have a bigger asset to paying-off. Some of this departments have been considered inefficient because in spite of achieving important funds, these have been not enough regarding the assets that dispose.
- ✓ With reference to the departments linked to Social Area, we must consider the outstanding teaching activity developed, much higher than the average of the University. There are not significant differences in the staff between the number academic staff doctor and academic staff non doctor. However their research activity is sensibly inferior than in other areas. Consequently it is in this field

where they should improve their performance, in particular those departments that have been computed as inefficient.

- ✓ Finally, the departments of the humanities area combine not much activity carried out with few resources consumed. Therefore the key factor of the efficiency of these departments is the slight use of inputs. Conversely, the departments that have been evaluated inefficient are those that more activity accomplished. The reason is a excessive consume of resources. Some of them show the lowest scores of the University, very distant from the frontier efficient level.

The aim of the study concern the identification of the strength and weaknesses in the departments of the University of Zaragoza. However, it is necessary to be careful with the judgements and conclusions that can be drawn from the results. The efficiency of a department is regarded from the point of view of that it is fairly impossible to assure that other departments carry out a best practice that it does it. The comparison between the outcomes with the targets settled, will determine if the performance is satisfactory. The scope of the study is just a comparative analysis of the activity conducted by the departments with the resources used for this purpose.

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